FATIGUE FRACTURES OF THE ULNA

DAVID L. EVANS, LONDON, ENGLAND

From the Institute of Orthopaedics, Royal National Orthopaedic Hospital

Fatigue fractures are rare in the upper limb. Hartley (1943) stated that fatigue fractures occurred as rarities in the humerus in javelin, discus and grenade throwers, and had been reported in the ulna in diggers. No reference to these can be traced. Two cases of fatigue fracture of the ulna were recorded by Troell, Lauritzen and Möller (1941), and Kitchin (1948) described another case. No other reference to fatigue fracture of the ulna has been discovered in the literature. Two cases are now reported.

CASE REPORTS

Case 1—A right-handed farm labourer, aged thirty and of average intelligence, complained of a painless swelling of the left forearm. One year before, while lifting sacks of oats weighing about one and a half hundredweight, he experienced pain in his left wrist. Ascribing it to a sprain he continued to work. The discomfort lasted only a few days, during which he wore a leather wrist strap. After this he was only aware that the left wrist ached a little when lifting heavy loads, which he continued to do. Three months later he noticed a painless swelling of his left forearm, which he ignored. Six months later, while off work with a cold, he happened to show his doctor his forearm, and thus was referred to hospital. At no time

Fig. 1
Fig. 2
Fig. 3

Case 1. Figure 1—Photograph showing the fusiform swelling of the left ulna. Figure 2—Initial radiograph, one year after the fracture. Non-union is established. Figure 3—Radiograph eighteen months after operation. The fracture is soundly consolidated.
had he had any pain in the forearm, though he had been doing heavy farm work throughout. There was no relevant past history. His general health had always been excellent, and he had served for five years in the army during the war in category A1.

On examination there was a fusiform, bony hard swelling just proximal to the middle of and continuous with the shaft of the left ulna (Fig. 1). There was no oedema or increase in temperature at this site, and the skin and underlying muscles moved freely over the swelling. Movements of the left wrist, elbow and radio-ulnar joints were full and painless. There were no enlarged regional lymphatic glands. All other systems were normal. The blood chemistry was normal. The Wassermann and Kahn reactions were negative.

Radiographs showed a pseudarthrosis in the middle of the shaft of the left ulna with much ensheathing new bone (Fig. 2). There was sclerosis in both fragments, especially the upper. Radiographs of the remainder of the skeleton were normal.

At operation the ulnar shaft was exposed and an ununited fracture confirmed. Cortical bone was removed to leave a level platform, and an onlay tibial graft secured in position across the fracture with four screws. The arm was not further immobilised. Histology of the bone removed was normal. Two months after operation he resumed his full farm work. A little initial aching of the wrist soon ceased, and at no time did he have any pain at the fracture site.

One year later he was working full time, with no symptoms except an occasional ache in his wrist. Examination did not reveal any change. All joint movements were full. Radiographs showed the graft well incorporated. There was some further evidence of sclerosis at the fracture site, and as yet little evidence of endosteal repair. He continued at work.
When last examined eighteen months after operation he had no symptoms. Clinically the forearm was unchanged. Radiographs showed the fracture to be soundly consolidated (Fig. 3).

Case 2—A right-handed cook, aged fifty-six, experienced sudden pain in the left forearm while lifting a heavy saucepan. She continued at work. One week later, while cutting up some food, she felt a cracking sensation in the left forearm. The forearm became painful and swollen and she was referred to hospital.

On examination there were tenderness and swelling over the distal third of the left ulna, and pain on movements. Radiographs showed a transverse fissure fracture of the lower third of the left ulna with no displacement (Fig. 4). All other investigations were normal.

An above-elbow plaster was applied. After nine weeks' immobilisation there was still some swelling and a little tenderness at the fracture site. Radiographs showed marked callus formation (Fig. 5). Immobilisation was continued for a total period of three months. When last examined, four months from the date of onset, she had no symptoms, and there were no abnormal physical signs. Radiographs showed the fracture well united (Fig. 6).

**REVIEW OF PREVIOUSLY REPORTED CASES**

Troell, Lauritzen and Möller (1941) described two cases. The first occurred in a girl aged sixteen while she was lifting a burden of hay on a pitchfork. She experienced a sudden stab of pain in the left forearm. She continued working for eleven days. Later the arm became swollen and tender. Radiographs three weeks later revealed a fracture of the left ulnar diaphysis in the way of recovery, with pronounced callus formation.” This was reported healed in five months.

The second case occurred in a girl, aged sixteen, under similar circumstances, while she was pitching hay into a barn loft. She experienced sudden pain in the right forearm. The arm was swollen and ached the same evening. She continued working for sixteen days. Radiographs showed a fracture of the right ulnar diaphysis with excess callus formation.” This was reported healed in eight weeks.

In neither case was the exact site of fracture or the method of treatment recorded.

Kitchin's (1948) case occurred in the middle of the shaft of the left ulna, in a healthy right-handed farm labourer aged twenty. Pain in the forearm had started three weeks before he was seen, while he was carting forkloads of stable manure. The pain did not prevent him from continuing at work. Examination revealed a fusiform swelling of the middle third of the left ulna, with heat, tenderness and slight oedema. There was a full range of elbow movement. Radiographs showed a fracture of the midshaft of the ulna, with considerable callus and a periosteal reaction extending upwards and downwards along the greater part of the diaphysis. He was treated in a plaster for ten weeks and resumed light work at four months. The fracture was soundly consolidated at fourteen months.

**DISCUSSION**

The similarity between Case 1 and the previously reported cases is striking. Each fracture occurred in a young healthy person engaged in farm work. In three cases this entailed lifting heavy loads of manure or hay on a fork, and in the fourth lifting heavy sacks of oats. In three cases, though pain was present at the fracture site, the patients were able to continue working for periods up to three weeks, and in Case 1 pain was so conspicuously absent that it was nine months before the patient sought medical advice.

In two cases the fracture occurred in the left ulna of right-handed men. In the other two cases, one occurred in the left and one in the right ulna, no mention being made of the master hand. In Kitchin's case "the left forearm supported both the downward thrust of the right hand and the pull of the resisting load," and in my Case 1 both forearms supported the weight of a considerable load. In each case the position of the forearm at the time of
strain was that of full supination with the elbow flexed to about a right angle. Thus in each case the weight was taken approximately at right angles to the ulnar shaft.

From the similarity of the history and clinical findings it seems probable that the mechanism of injury in Troell, Lauritzen and Möller’s cases was the same. If so, then one must assume that in the case with the right ulnar fracture, the patient was left handed. Unfortunately this was not recorded.

In my Case 2 the fracture occurred in an older patient. The position of the upper limb at the time of fracture is not known. It seems possible that in lifting a heavy saucepan the forearm would be similarly supinated and the elbow flexed.

The site of fracture in Kitchin’s case and in Case 1 was just proximal to the middle of the shaft of the ulna and about one inch distal to the usual site of entry of the nutrient artery. At this point the ulna shaft is at its widest because the interosseous ridge is well marked. In Case 2 the fracture occurred in the lower third of the ulna at a site where the shaft is at its narrowest.

At both these sites there is a well marked change in cross-sectional shape of the ulnar shaft (Fig. 7). This may be a potential source of weakness. Nevertheless there does not appear to be any significant alteration in the ratio of compact to cancellous bone at these sites, as measured on serial sections.

The fatigue fracture of the metatarsal is commonly called a “march” fracture. Burrows (1948) labelled the low fibular fracture a “running” fracture and the high fibular fracture a “jump” fracture. The ulnar fatigue fracture appears to be a “lifting” fracture.

**SUMMARY**

1. Two cases of fatigue fracture of the ulna are reported.
2. Three cases previously reported are reviewed and a striking similarity with one of the present cases is noted.
3. In all cases the mechanism of injury appears to have been the same.

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**REFERENCES**


